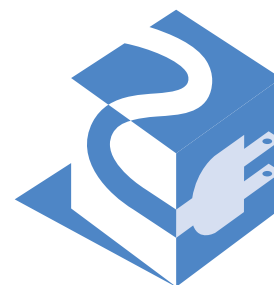


ELECTRICITY



ELECTRICITY

Since 2003, the electricity sector has received the second-largest investment of Iraq reconstruction funds, amounting to more than \$4.6 billion. Despite this major investment, which funded the repair and rehabilitation of generation facilities, transmission lines, and distribution networks, the Iraqi electric grid remains fragile and vulnerable. Thus, the power generated does not meet demand.²⁰³

This quarter, electricity output declined for the month of May, but rebounded in mid-June.²⁰⁴ Actual peak generation²⁰⁵ this quarter averaged approximately 4,230 mega-

watts (MW) of power per day, which is above the previous quarter's output but 1,750 MW below the reconstruction goal of 6,000 MW generated per day. Actual peak demand this quarter was 8,120 MW per day.²⁰⁶ Table 2.8 and Table 2.9 compare production and output this quarter with the same period last year and pre-war production levels.

Baghdad

This quarter, Baghdad received an average of 8.1 hours of power²⁰⁷ per day, almost 4 hours less than the rest of the country but higher

CURRENT ACTUAL PEAK PRODUCTION VS. PAST PRODUCTION LEVELS (MEGAWATTS)

OUTPUT METRIC	DAILY AVERAGE, LAST WEEK OF JUNE 2007
Actual Peak Power Generated (MW)	4,230
% Change, Previous Quarter (3,872 MW)	9%
% Change, June 2006 (4,201 MW)	1%
% Change, Pre-war Level (4,500 MW)	-6%

Sources: Pre-War level: DoS briefing by U.S. Embassy-Baghdad, November 30, 2005; Goals: Joint U.S.-Iraqi Electricity Action Plan; Current: ITAO, Electric Daily Units Performance Report, last week of June 2007 (6/24-6/30/2007); last week of March 2007 (3/20-3/26/2007); last week of June 2006 (6/24-6/30/2006); last week of March 2006 (3/25-3/31/2006)

TABLE 2.8

CURRENT TOTAL AVAILABLE PRODUCTION VS. PAST PRODUCTION LEVELS (MEGAWATTS)

OUTPUT METRIC	DAILY AVERAGE, LAST WEEK OF JUNE 2007
Total Available Capacity (MW)	4,558
% Change, Previous Quarter (4,068 MW)	12%
% Change, June 2006 (4,517 MW)	1%
% Change, Pre-War Level (n/a)	n/a

Sources: IRMO/ITAO, Weekly Status Report (12/14/2005 – 6/26/2007) Pre-War level: DoS Briefing by U.S. Embassy-Baghdad, November 30, 2005; Goals: Joint U.S.-Iraqi Electricity Action Plan; Current: ITAO, Electric Daily Units Performance Report: last week of June 2007 (6/24-6/30/2007), last week of March 2007 (3/20-3/26/2007), last week of June 2006 (6/24-6/30/2006), last week of March 2006 (3/25-3/31/2006)

Note: Total Available Capacity = Actual Peak Capacity (MW) + Iraq Import (MW).

TABLE 2.9



HOURS OF POWER BAGHDAD

OUTPUT METRIC	DAILY AVERAGE, LAST WEEK OF JUNE 2007
Baghdad Hours of Power/Day	8.1
% Change, Previous Quarter (6.5 Hours)	25%
% Change, June 2006 (8.1 Hours)	0%
% Change, Pre-war Level (16-24 Hours)	-66%

Source: ITAO, Electric Daily Units Performance Report, last week of June 2007 (6/24-30/2007), last week of March 2007 (3/20-3/26/2007), last week of June 2006 (6/24-6/30/2006)

TABLE 2.10

than last quarter. Baghdad averaged the same amount of hours of power in the same period last year.

Available power in Baghdad continues to lag behind pre-war levels for these reasons:

- The U.S. reconstruction strategy in this sector focused on providing power more equitably throughout the country.
- Power lines that feed the capital continue to be attacked.
- Transferring power to the capital from large plants in northern and southern Iraq has been compromised by local political manipulation of the power grids.

Table 2.10 compares the hours of power for Baghdad with the measure for the first quarter of this year, the quarter ending in June 2006, and pre-war levels.

Baghdad has never had enough power plants to meet its own demand, and thus it must import power from other regions. Building new plants is part of the GOI's long-term power-generation plan.

ITAO reports that improper "fuel supplies continue to be a major setback for increasing the amount of electricity in the country and the Baghdad Ring."²⁰⁸ As SIGIR has noted in previous reports, 16 of the 35 gas turbines installed by the United States are currently using less than optimum fuel—such as diesel, crude, or heavy fuel—instead of the natural gas for which they were designed. This practice greatly increases maintenance requirements and decreases overall capacity.



Transmission lines continue to be the target of saboteurs.²⁰⁹ As of June 30, 2007, eight of the twelve 400-kV lines were out of service.²¹⁰ Three transmission lines feed power to Baghdad from the north, and two of these lines were out of service during the past quarter.²¹¹ In the south, three of the four transmission lines that feed Baghdad were out of service during this quarter.

Iraq’s power system “remains very fragile and experiences frequency drops that result in breakers tripping and blackouts.”²¹² The Ministry of Electricity’s National Dispatch Center is supposed to manage electricity usage for the provinces based on demand. But this quarter, blackouts were caused by the “refusal of the provinces to follow the allocations from the Ministry of Electricity.”²¹³

One key to providing more power to the Baghdad ring is “get[ting] control of distribution circuit breakers and the substations in the

outer provinces.”²¹⁴ In May, Baghdad consumed an average of 15% of Iraq’s total electricity generation—12% below its allocation from the National Dispatch Center.²¹⁵ The GOI must continue to develop control over the substations that operate and maintain the local grids because these stations are essential to supplying more power to Baghdad.

Outside Baghdad

Outside Baghdad, hours generated of electrical power for the last week in June 2007 (nearly 12 hours per day) was greater than before the U.S.-led invasion but 13% below the measure of hours of power for the same period last year. See Table 2.11 for the measure of hours of power compared to pre-war levels.

HOURS OF POWER OUTSIDE BAGHDAD

OUTPUT METRIC	DAILY AVERAGE,
	LAST WEEK OF JUNE 2007
Iraq Hours of Power/Day	11.85
% Change, Previous Quarter (14 hours)	-15%
% Change, June 2006 (13.6 hours)	-13%
% Change, Pre-war Level (4-8 hours)	48%

Sources: Pre-war level: DoS Briefing by U.S. Embassy-Baghdad, November 30, 2005; Current: ITAO, Electric Daily Units Performance Report: last week of June 2007 (6/24-6/30/2007), last week of March 2007 (3/20-3/26/2007), last week of June 2006 (6/24-6/30/2006)

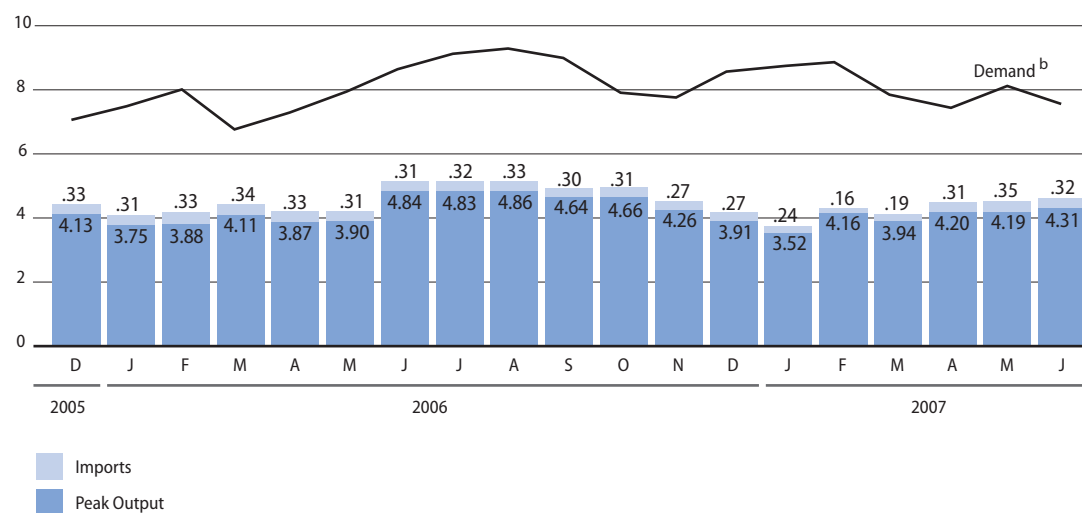
TABLE 2.11



Figure 2.33

ELECTRICITY DEMAND VS. CAPACITY

Monthly Average Gigawatts (GW = 1,000 MW)

Source: IRMO, *Weekly Status Reports* (12/14/2005 - 5/8/2007); ITAO,^a *Weekly Status Reports* (5/8/2007 - 6/26/2007)

a. By Executive Order, on May 8, 2007, the President created ITAO as the successor organization to the IRMO.

b. The demand for electrical output is not constant; from 12/2005 - 3/2007, the seasonal demand ranged from 6.39 to 9.61 GW per week.

Figure 2.33 indicates that demand for electricity—8,120 MW on average this quarter—continues to significantly surpass Iraq's average peak generation capacity. Iraq imported slightly more than 300 MW per day this quarter, bringing total available capacity to 4,550 MW per day.

Blackouts happen frequently across Iraq because of local breakdowns at key power-transfer points. Insurgents are also targeting the smaller, more local 132-kV lines that direct power across the provinces. These lines are often controlled by local substations.

This quarter, Anbar province generated more power than the governorate demands

because of the increased production at a provincial hydroelectric plant. However, Anbar has been reluctant to share excess power with the national grid.²¹⁶

U.S. Support for Electricity

The United States has allocated approximately \$4.61 billion to the electricity sector in Iraq through three major funds. See Figure 2.34. U.S. electricity projects have contributed 2,700 MW to Iraq's generation capacity.²¹⁷

To boost capabilities, the U.S. reconstruction program funded three major types of projects in the electricity sector:

- Generation facilities produce power for the



system.

- Transmission networks carry that power across the country.
- Distribution networks deliver the transmitted power to local areas, homes, and businesses.

As of June 27, 2007, nearly 82% of electricity sector IRRF obligations had been expended.²¹⁸ See Figure 2.35 for the status of all U.S. funds obligated in the electricity sector.

IRRF

Reprogrammings of the IRRF reduced electricity sector funding by \$1 billion, leaving 23% of the IRRF 2 allocated to electricity.

The IRRF 1 reconstruction goal for the electricity sector was to increase peak generation output to 6,750 MW from a pre-war level of 4,500 MW,²¹⁹ but the goal was subsequently reduced to 6,000 MW. For projects funded by IRRF 2, see Figure 2.36.

Major IRRF-funded projects in the generation, transmission, and distribution areas include:

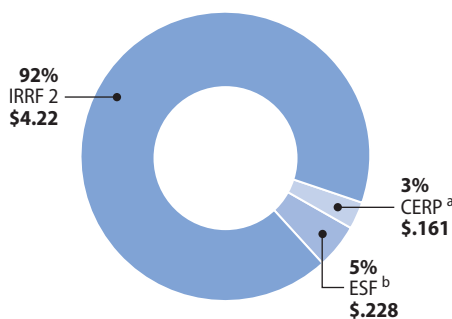
- **Doura Power Station (320-MW capac-**

Figure 2.34

ALLOCATIONS TO ELECTRICITY

\$ Billions, % of \$4.61 Billion

Sources: DoS, *Iraq Weekly Status* (6/27/2007); MNC-I, Response to SIGIR (7/7/2007); IRMS, *ESF Economic Track Summary* (7/5/2007)



Note: Numbers are affected by rounding.

a. Allocation detail at the sector and subsector level for CERP is currently unavailable; therefore, the percentages for CERP are calculated using FY 2006 and FY 2007 dollars obligated.

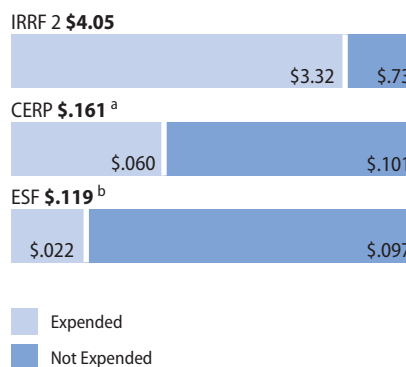
b. FY 2006 Supplemental Funds (P.L. 109-234).

Figure 2.35

OBLIGATIONS FOR ELECTRICITY

\$ Billions, \$4.33 Billion Total

Sources: DoS, *Iraq Weekly Status* (6/27/2007); MNC-I, Response to SIGIR (7/7/2007); IRMS, *ESF Cost to Complete* (7/5/2007)



a. FY 2006 and FY 2007.

b. FY 2006 Supplemental Funds (P.L. 109-234).



ity). SIGIR conducted an inspection of the Doura project this quarter. SIGIR inspectors found that in August 2006, equipment was removed from Unit 6 as it neared operational status and placed into Unit 5 to expedite its restart after catastrophic failure. Ministry of Electricity officials decided to swap the exciter from Unit 6 to Unit 5 to minimize outage time and to quickly restore electric power to the Baghdad grid as a short-term solution. However, Unit 5 failed, and Unit 6 was rendered inoperable because of the switch. Therefore, 320 MW of electricity was unavailable to the Baghdad grid. For details on this inspection, see section 3.

- **Qudas Expansion Project (180-MW capacity).** The Qudas Power Plant has eight gas turbine generators, four of which are offline because of maintenance and fuel shortages. The project end-date is scheduled for January 2008, which is later than

planned because orders of equipment were placed late.²²⁰

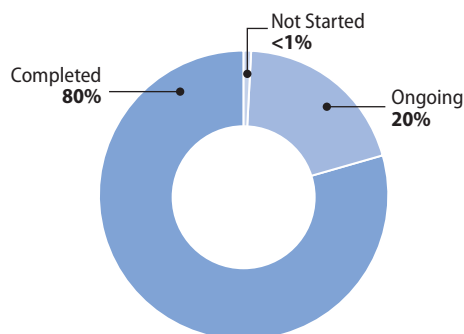
- **Khor al-Zubair Generation Plant (250-MW capacity).** The United States funded generation work at this power plant. A SIGIR inspection reported that the plant was functioning properly as of April 2006. The plant's six gas turbine generators remain operational.
- **Baiji Power Plant (320-MW capacity).** The United States funded repairs to mobile engines and inspections of three gas turbine generators. Three of Baiji's four gas turbine generators are working, but all eight small mobile generators are offline.
- **Substations.** The United States funded repairs to the Baghdad West substation and extensions in the north and south. SIGIR inspections have reported positive outcomes on work at five substations in Basrah.

Figure 2.36

STATUS OF IRRF 2 PROJECTS - ELECTRICITY

TOTAL NUMBER OF PROJECTS: 529

Sources: IRMS, ITAO* Rollup (6/29/2007); USAID, Activities Report (7/12/2007)



Project Type	Not Started	Ongoing	Completed	Total
Distribution	1	75	342	418
Transmission	1	24	33	58
Generation		1	47	48
Automatic Monitoring and Control System		4	1	5
Total	2	104	423	529

Note: Numbers are affected by rounding.

* By Executive Order, on May 8, 2007, the President created ITAO as the successor organization to the IRMO.



The IRRF funded the Supervisory Control and Data Acquisition network (SCADA), which was expected to help maximize the availability of electricity across Iraq by automating the distribution of power across Iraq. However, GRD reported to SIGIR this quarter that the SCADA projects were terminated because of budget overruns.

According to GRD, “there is no firm commitment to complete this work with IRRF funds; however, ITAO may continue to complete the system using alternative means.”²²¹ In April, DoS reported that the Ministry of Electricity will be provided with “drawings, equipment and material, a detailed list of what equipment has been installed and tested and a list of equipment and testing that remains to be completed.”²²²

CERP

CERP FY 2006 and FY 2007 funds represent 3% of the total U.S. funds allocated for electricity reconstruction in Iraq and 17% of the total CERP funds allocated for reconstruction in Iraq. MNC-I has undertaken 741 electricity projects with CERP FY 2006 and FY 2007 funds. CERP-funded projects support local efforts to repair electrical distribution and transmission systems to ensure that power reaches Iraqi homes. Figure 2.37 shows the status of sector projects funded by the CERP.

According to GRD, 21 CERP electricity projects, totaling \$33.8 million, have been programmed in Baghdad.²²³ In Babylon, nearly \$700,000 of the CERP is being used to repair the **Mussayib Electrical Network**. This project has the potential to provide an electrical network to 5,000 homes.²²⁴ In Ramadi, CERP is

Figure 2.37

STATUS OF CERP FY 2006 AND FY 2007 PROJECTS - ELECTRICITY

TOTAL NUMBER OF PROJECTS: 741

Source: MNC-I, Response to SIGIR (7/7/2007)

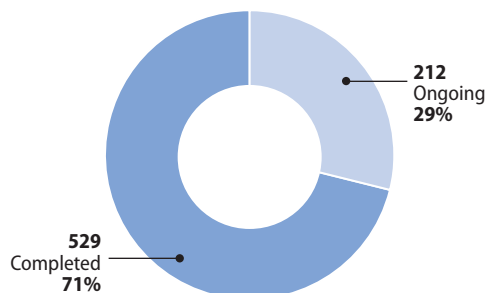
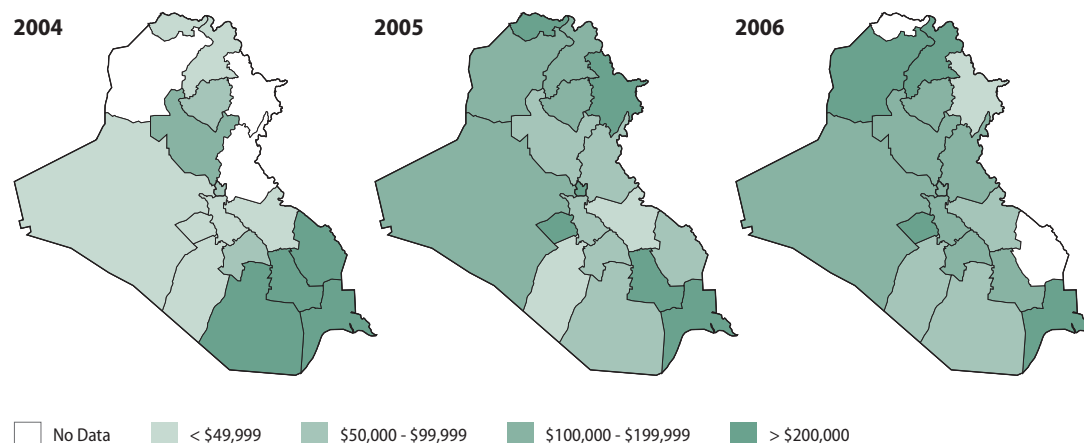




Figure 2.38

AVERAGE VALUE PER CERP ELECTRICITY PROJECT BY GOVERNORATE

Source: IRMS, CERP Excel Workbook (6/29/2007)



Note:

Data is compiled using FY 2004, FY 2005, and FY 2006 CERP funds. Years indicated correspond to the actual start dates of the projects.

funding a \$3 million project that will install a 132-kV circuit at the regional substation.²²⁵

As IRRF funding in this sector has been expended, CERP funds have taken on an increasingly significant role. Since 2004, the average value of CERP electricity projects in Iraq rose from \$94,000 in 2004 to \$194,000 in 2006.²²⁶ In 12 provinces, CERP FY 2006 electricity projects averaged more than \$100,000 in value, including Basrah and Kerbala, where the average CERP electricity project was valued at more than \$500,000.

This quarter, SIGIR announced that it is undertaking an audit of CERP projects in Iraq valued at more than \$400,000. Figure 2.38 shows the average value of electricity projects from 2004 to 2006.

ESF

Electricity projects received approximately \$228 million of ESF FY 2006 supplemental

funds through the O&M Sustainment program.²²⁷ Approximately 80%²²⁸ of the total amount programmed for ESF's O&M Sustainment program was allocated to electricity projects.²²⁹

USACE GRD is the implementing agency for this program. GRD has completed 43 statements of work, initiated procurement actions for 39 of 62 O&M sustainment projects, and awarded contracts for 6 sustainment efforts, totaling \$83.6 million.²³⁰ Figure 2.39 shows the status of the ESF O&M Sustainment projects for electricity.

O&M is particularly important for the Ministry of Electricity. DoS reports that "the long-term success of reconstruction relies heavily on the ability of the [Ministry] to execute an effective O&M program."²³¹ SIGIR's inspection of the Doura Power Plant showed that sustainable operations of generators cannot be reasonably assured "unless the Ministry of



The Iraqi power grid remains very fragile and susceptible to attacks and breakdown.

Electricity's O&M practices improve." SIGIR inspectors also noted that "too often, the ministry has operated improperly or insufficiently maintained equipment in environments where equipment failure was likely."

Since last quarter, the Ministry of Electricity has completed one of two planned O&M contracts for support training. A contractor has been mobilized to support education in

engineering and machine-specific training. The second contract, which has not yet been completed, has been hindered by problems obtaining visas and passports for trainees.²³²

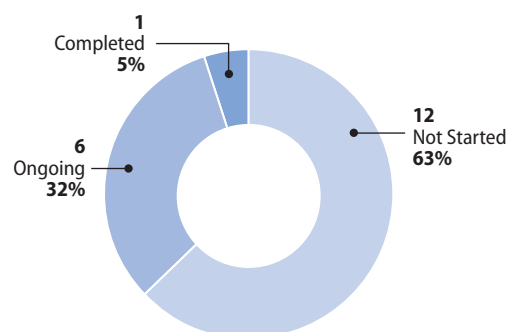
The ESF Capacity Development and Technical Training program also provides an additional \$25 million for electricity projects.

Figure 2.39

STATUS OF ESF* PROJECTS - ELECTRICITY

TOTAL NUMBER OF PROJECTS: 19

Source: IRMS, ESF Project Tracker (6/29/2007)



* Funded by the ESF FY 2006 Supplemental.

ELECTRICITY

